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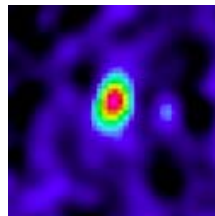


## SCIENCE NEWS GALAXIES

### Early Molecules Found in Distant Quasar

Carbon monoxide found in a distant quasar is made of atoms created in some of the universe's earliest stars.

by Vanessa Thomas



This radio image of the remote galaxy J1148+5251 was taken by the Very Large Array.  
NRAO / AUI / NSF

Using the Very Large Array in New Mexico and the Plateau de Bure radio [interferometer](#) in the French Alps, astronomers have found a huge amount of carbon monoxide gas accompanying the most distant [quasar](#) known.

The gas belongs to the quasar's host [galaxy](#), called J1148+5251 and located more than 12.8 [billion](#) light-years from Earth. The galaxy as we see it today exists at a time when the [universe](#) was just 870 [million](#) years old, or about one-sixteenth its current age.

"Our discovery of this much carbon monoxide gas in such an extremely distant and young galaxy is surprising," says team member Chris Carilli of the National Radio [Astronomy](#) Observatory (NRAO). "It

means that, even at a very early time in the history of the universe, galaxies already had huge amounts of molecular gas that would eventually form new generations of stars."

Carbon monoxide gas has been found in far-off galaxies before, but never in one from such a primitive cosmic era.

"The carbon and oxygen atoms in the gas we detected were made by some of the first stars ever formed," notes NRAO astronomer Fabian Walter, lead author of a report in the July 24 issue of *Nature* that describes the observations.

These elements were not inherent to the very early universe but had to be synthesized by [nuclear fusion](#) in the cores of stars. So within the first 870 million years after the [Big Bang](#), a whole generation of stars would have had to have formed, created carbon and oxygen in their cores, and exploded as supernovae to scatter the new elements into the young universe, while still allowing time for these atoms to cool and combine into the carbon monoxide molecules found in the remote galaxy.

The team uncovered more than 10 billion solar masses of carbon monoxide gas in the galaxy, which suggests these molecules were created quickly and on a much larger scale than expected.

"This is as much [mass](#) as we see in big galaxies today, and it had little time, astronomically speaking, to accumulate," explains Carilli.

He and his colleagues plan to continue using the VLA, the Plateau de Bure interferometer, and future radio telescopes such as the Atacama Large Millimeter Array (ALMA) to continue studying this and other distant quasars and to learn more about the early evolution of stars, galaxies, and the universe.



The Very Large Array helped to discover the huge supply of remote carbon-monoxide gas.  
D. Finley / NRAO / AUI

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